

**TOSHIBA**

TA75902P/F/FB

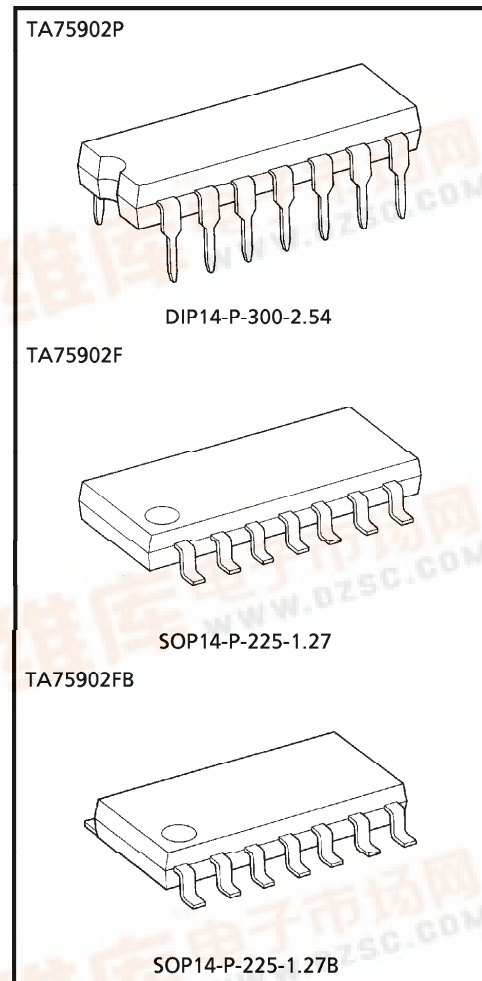
TOSHIBA BIPOLAR LINEAR INTEGRATED CIRCUIT SILICON MONOLITHIC

# TA75902P, TA75902F, TA75902FB

## QUAD OPERATIONAL AMPLIFIER

### FEATURES

- In the linear mode the input common mode voltage range includes ground.
- Four internally compensated OP amps are in single package.
- Low power dissipation and power drain suitable for battery operation.
- Differential input voltage range equal to the power supply voltage.
- Large output voltage swing :  $0V \sim V_{CC} - 1.5V$
- Wide power supply voltage range and signal power supply :  
Single Supply 3~36V  
Dual Supplies  $\pm 1.5 \sim 18V$
- Low input biasing current :  $I_I = 45nA$  (Typ.)



Weight	
DIP14-P-300-2.54	: 1.0g (Typ.)
SOP14-P-225-1.27	: 0.2g (Typ.)
SOP14-P-225-1.27B	: 0.2g (Typ.)

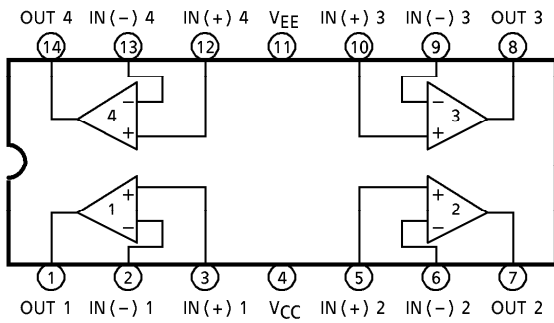
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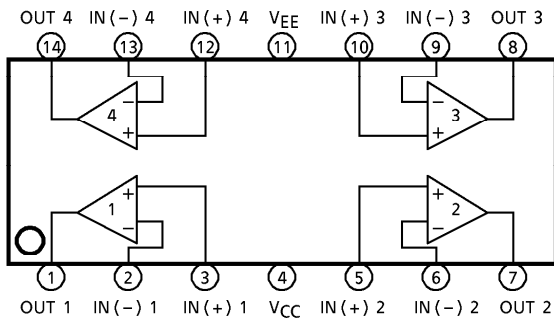


**PIN CONNECTION (TOP VIEW)**

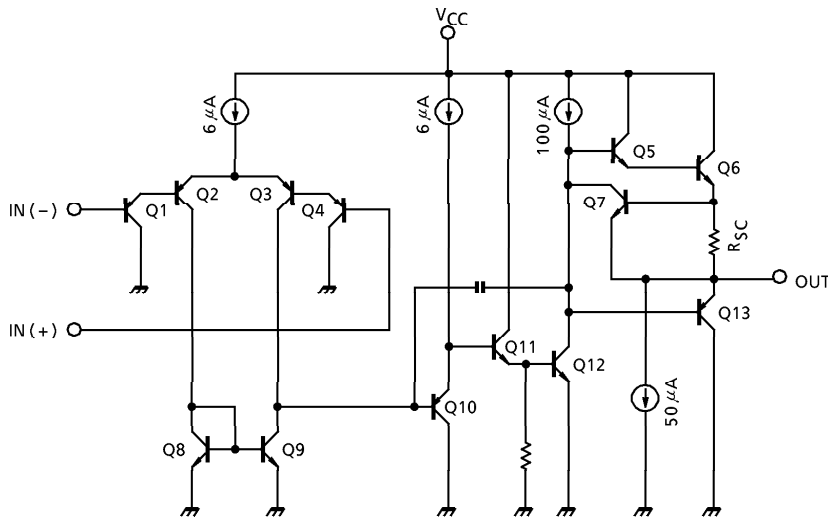
**TA75902P**



**TA75902F  
TA75902FB**



**EQUIVALENT CIRCUIT**



**MAXIMUM RATINGS (Ta = 25°C)**

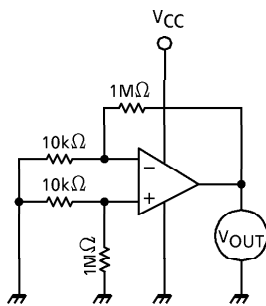
CHARACTERISTIC	SYMBOL	RATING	UNIT
Supply Voltage	$V_{CC}, V_{EE}$	$\pm 18$ OR 36	V
Differential Input Voltage	$DV_{IN}$	$\pm 36$	V
Input Voltage	$V_{IN}$	-0.3~36	V
Power Dissipation	TA75902P	625	mW
	TA75902F	280	
	TA75902FB	280	
Operating Temperature	$T_{opr}$	-40~85	°C
Storage Temperature	$T_{stg}$	-55~125	°C

**ELECTRICAL CHARACTERISTICS (V<sub>CC</sub> = 5V, V<sub>EE</sub> = GND, Ta = 25°C)**

CHARACTERISTIC	SYMBOL	TEST CIR-CUIT	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Input Offset Voltage	$V_{IO}$	1	$R_g \leq 10k\Omega$	—	2	7	mV
Input Offset Current	$I_{IO}$	2	—	—	5	30	nA
Input Bias Current	$I_I$	2	—	—	45	150	nA
Common Mode Input Voltage	$CMV_{IN}$	3	$V_{CC} = 30V, V_{EE} = GND$	0	—	$V_{CC} - 1.5$	V
Supply Current	$I_{CC}, I_{EE}$	4	$R_L = \infty, ALL\ OP\ Amps$	—	0.7	1.2	mA
Voltage Gain	$G_V$	5	$R_L \geq 2k\Omega$	86	100	—	dB
Maximum Output Voltage Swing	$V_{Op-p}$	6	$R_L = 2k\Omega$	0	—	$V_{CC} - 1.5$	V
Common Mode Input Signal Rejection Ratio	CMRR	3	—	60	85	—	dB
Supply Voltage Rejection Ratio	SVRR	1	$R_g = 10k\Omega$	60	100	—	dB
Source Current	$I_{source}$	6	IN (-) = 0V, IN (+) = 1V	20	40	—	mA
Sink Current	$I_{sink}$	6	IN (-) = 1V, IN (+) = 0V	10	20	—	mA

**TEST CIRCUIT**

(1)  $V_{IO}$ , SVRR

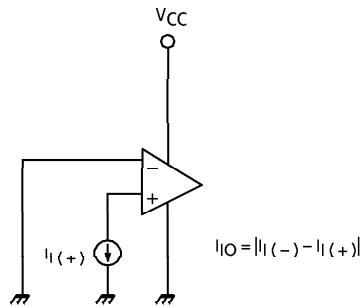
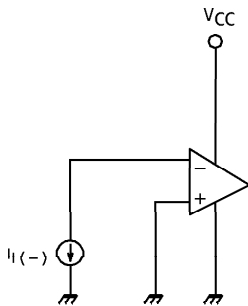


- $V_{IO} = V_{OUT} / 100$
- $SVRR = 20 \log E \text{ (dB)}$

$$E = \left| \frac{V_{OUT1} - V_{OUT2}}{V_{CC1} - V_{CC2}} \right| \times \frac{1}{100}$$

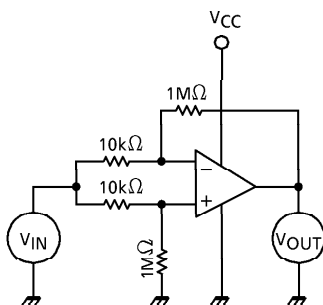
$V_{OUT1}$  :  $V_{OUT}$  ( $V_{CC1} = 5V$ )  
 $V_{OUT2}$  :  $V_{OUT}$  ( $V_{CC2} = 10V$ )

(2)  $I_I$ ,  $I_{IO}$



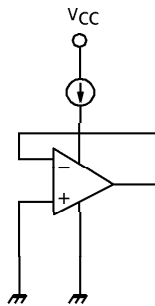
$$I_{IO} = |I_I(-) - I_I(+)|$$

(3)  $CMV_{IN}$ , CMRR



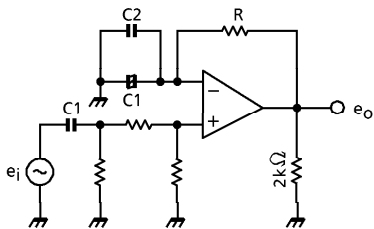
- $CMRR = 20 \log \cdot G_D / G_C \text{ (dB)}$   
 $G_D$  : DIFFERENTIAL VOLTAGE GAIN  
 $G_C$  : COMMON MODE VOLTAGE GAIN
- $CMV_{IN}$  :  $V_{IN} = 0V$ ,  $V_{CC} - 1.5V$  SUPPLES

(4)  $I_{CC}$



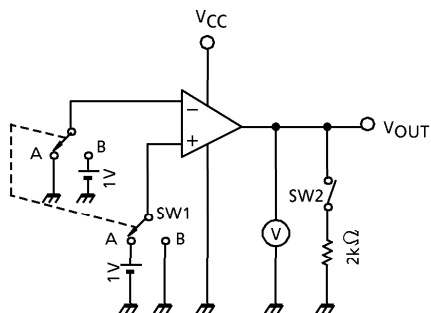
- $I_{CC} : (V_{CC} = 5V)$

(5)  $G_V$



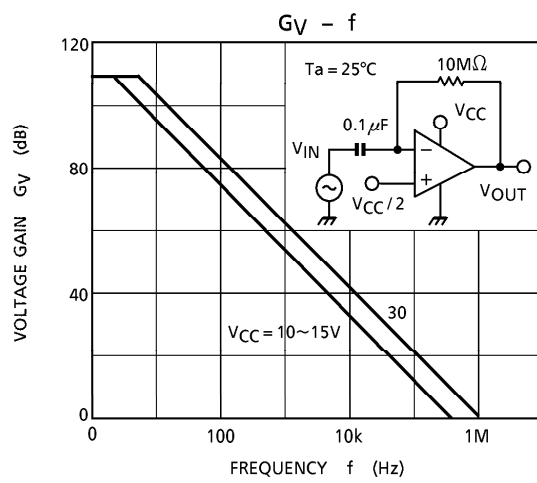
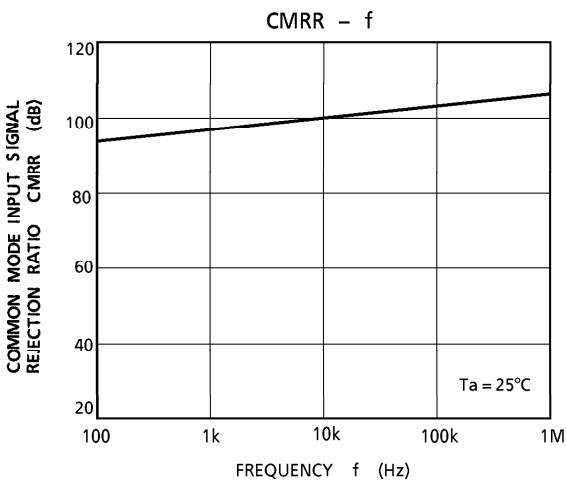
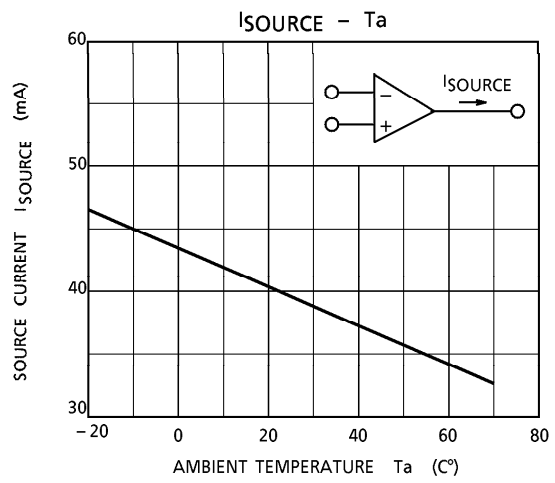
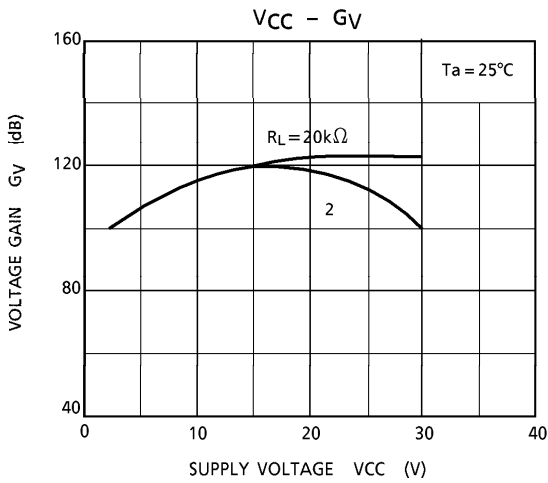
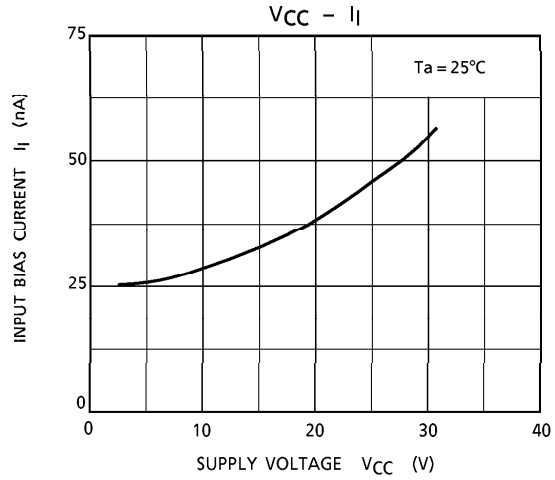
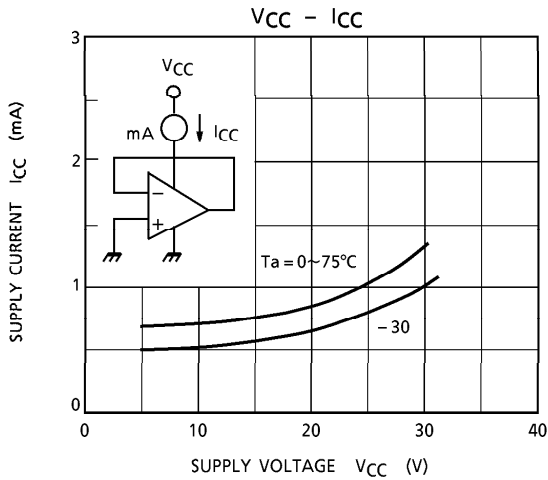
- $G_V = 20 \log e_o / e_i$  (dB)  
 $R \gg 1 / \omega C_1$   
 C1 : COUPLING CONDENSER  
 C2 : HIGH FREQUENCY BYPASS CONDENSER

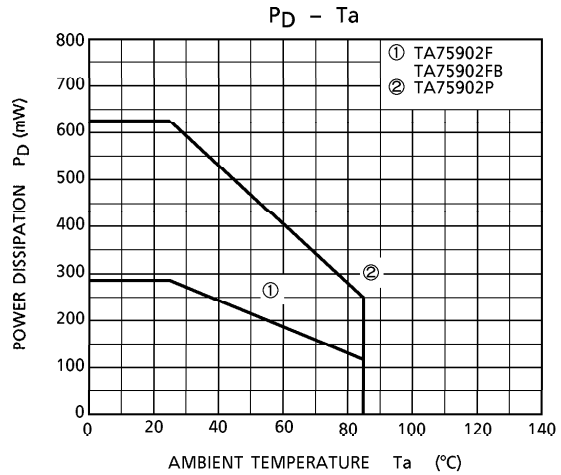
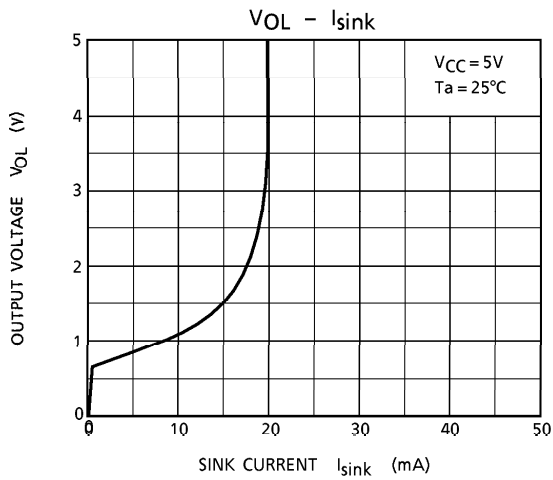
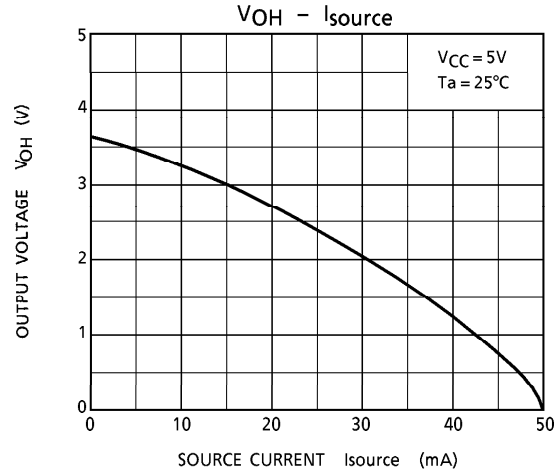
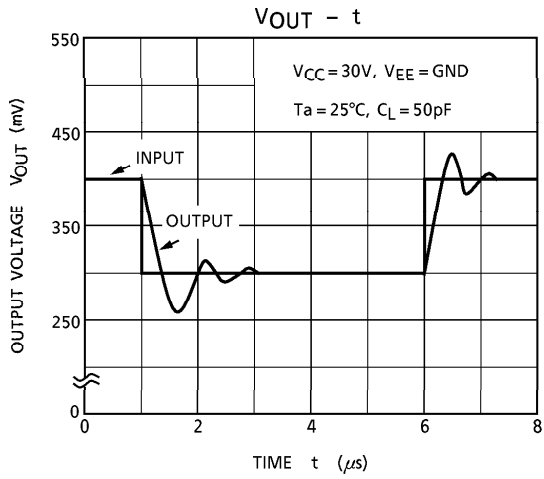
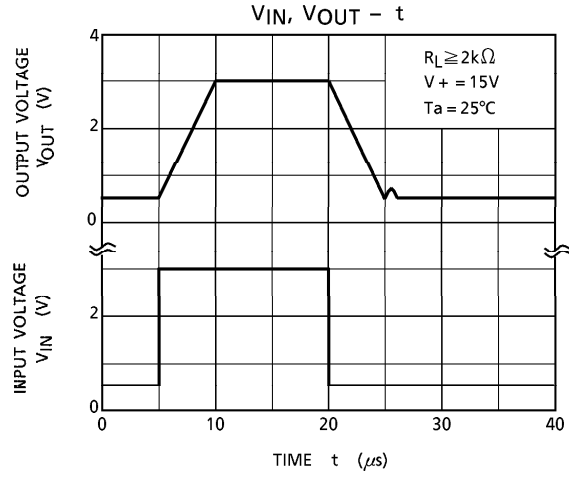
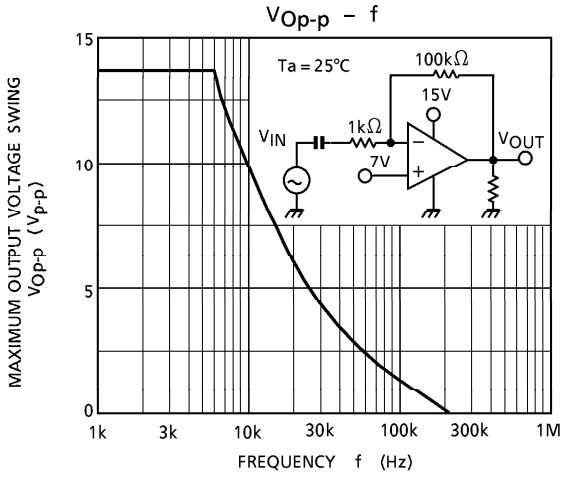
(6)  $V_{Op-p}$ ,  $I_{source}$ ,  $I_{sink}$



- $V_{Op-p}$   
 $V_{OH}$  : SW1 IS SIDE A  
 $V_{OL}$  : SW1 IS SIDE B
- $I_{source}$   
 SW1 IS SIDE A  
 $V_{OUT} \rightarrow 0V$  MEASURE
- $I_{sink}$   
 SW1 IS SIDE B  
 $V_{OUT} \rightarrow 5V$  MEASURE

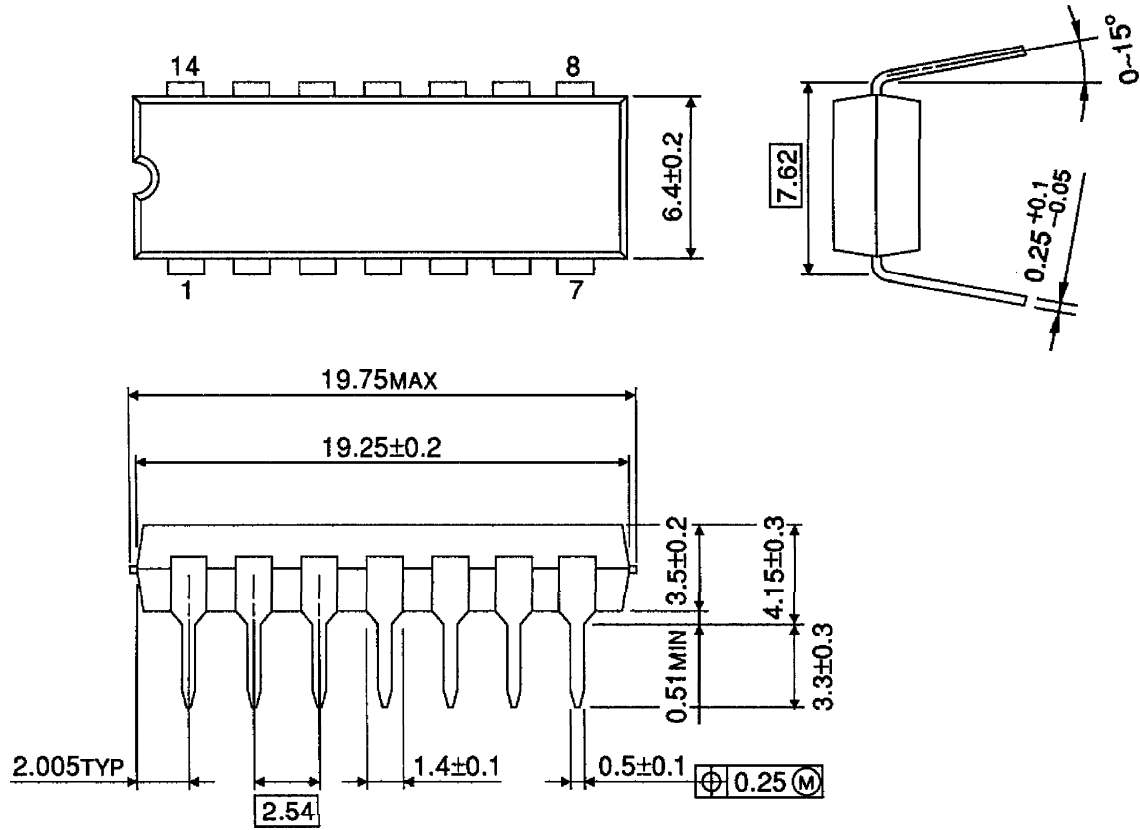
**CHARACTERISTICS**





OUTLINE DRAWING  
DIP14-P-300-2.54

Unit : mm

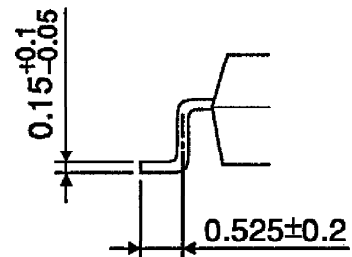
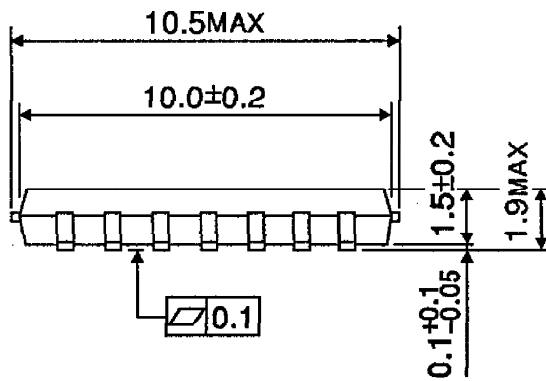
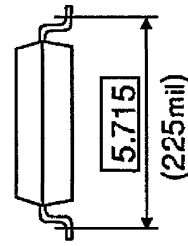
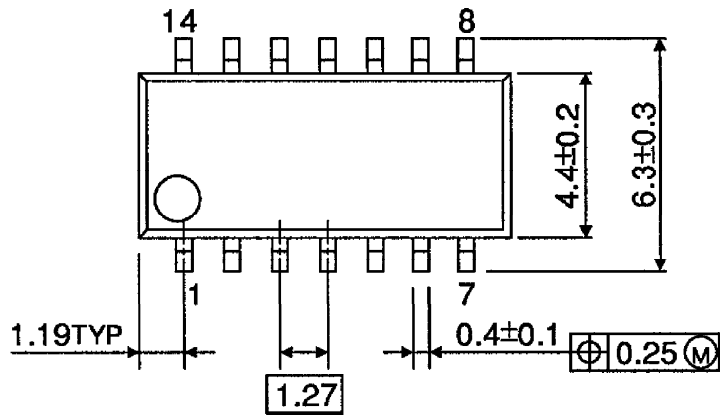


Weight : 1.0g (Typ.)



OUTLINE DRAWING  
SOP14-P-225-1.27

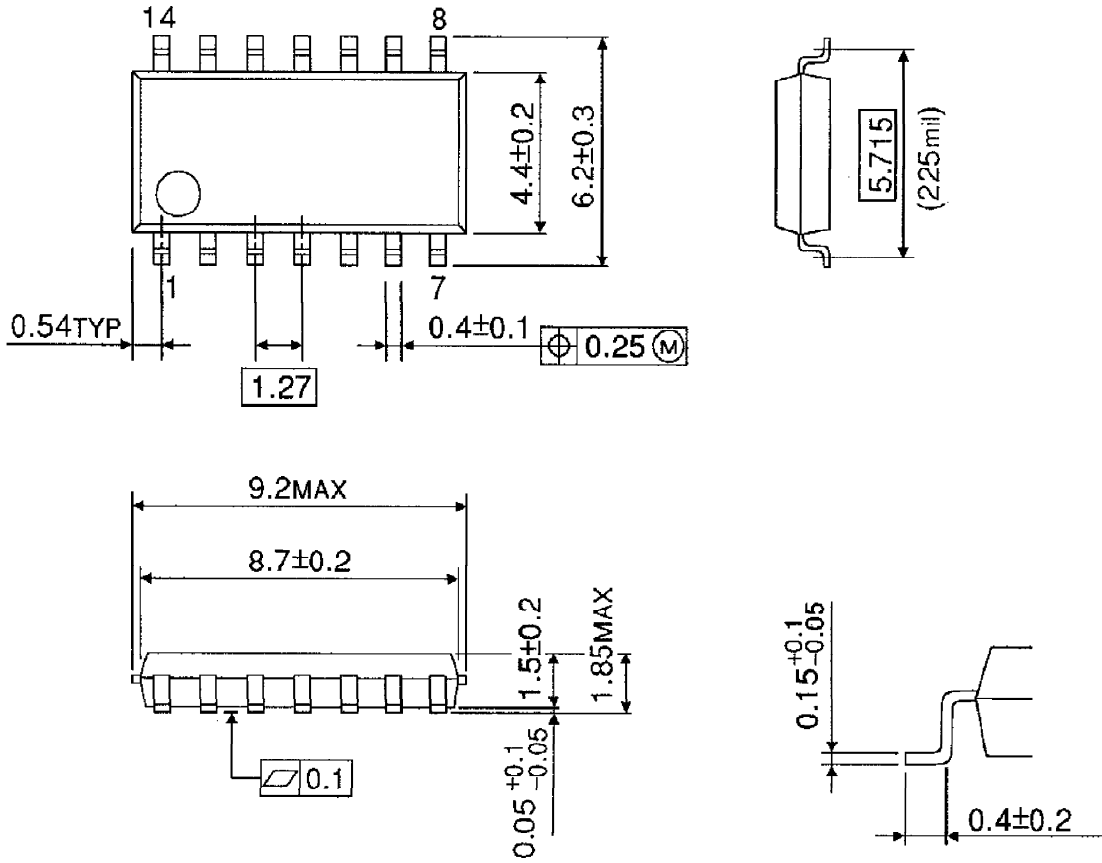
Unit : mm



Weight : 0.2g (Typ.)

OUTLINE DRAWING  
SOP14-P-225-1.27B

Unit : mm



Weight : 0.2g (Typ.)